In the Claims

1. (Original) A rollover control method, the method comprising the steps of:

detecting a steering angle, a wheel Revolutions Per Minute (RPM), a roll angle, a roll rate, a yaw rate and a vehicle speed detected according to the change of the operation state of a vehicle;

processing said steering angle and said wheel RPM thus detected by a vehicle dynamical equation, thereby calculating a longitudinal velocity, a lateral velocity, a yaw rate, a roll rate, a roll angle, a slip angle, and a slip ratio;

predicting a slip angle transiently generated while said yaw rate, said roll rate, said roll angle, and said vehicle speed thus detected and the values calculated using said vehicle dynamical equation are processed by a filter;

calculating a tire lateral force based on said slip angle thus predicted ;

performing a pre-rollover decision subroutine that estimates the possibility of generating a rollover based on said tire lateral force thus computed;

predicting a lateral velocity using the filter when there is a possibility of a generation of a rollover at said pre-rollover decision subroutine; and

performing a rollover decision subroutine that assesses the rollover based on said lateral velocity thus predicted.

2. (Original) The rollover control method as defined in claim 1, wherein said filter is a Kalman filter.

3. (Currently Amended) The rollover control method as defined in claim 1, wherein the vehicle dynamical equation for calculating said longitudinal velocity, said lateral velocity, said yaw rate, said roll rate, said roll angle, said slip angle, and said slip ratio can be defined by the following mathematical equations:

3. (Currently Amended) The rollover control method as defined in claim 1, wherein the vehicle dynamical equation for calculating said longitudinal velocity, said lateral velocity, said yaw rate, said roll rate, said roll angle, said slip angle, and said slip ratio can be defined by the following mathematical equations:

Longitudinal Velocity, V_x :

$$\dot{V}_x = \frac{F_x}{m} + r \cdot V_y + r \cdot p \cdot \frac{m_s \cdot h}{m}$$

Lateral Velocity, V_y :

$$\dot{V}_y = -r \cdot V_x - \frac{1}{K_{vy}} \cdot \left[F_y \cdot \left(I^2_{xz} - I_x \cdot I_z \right) + m_s \cdot h \cdot \left(I_z \cdot T_x + I_{xz} \cdot T_z \right) \right]$$

Yaw Rate, r :

$$\dot{r} = \frac{1}{K_{vy}} \cdot \left[\left(m \cdot I_x - m^2{}_s \cdot h^2 \right) \cdot T_z + m \cdot I_{xz} \cdot T_x - m_s \cdot h \cdot I_{xz} \cdot F_y \right]$$

Roll Rate, p :

$$\dot{p} = \frac{1}{K_{vy}} \cdot \left[m \cdot \left(I_z \cdot T_x + I_{xz} \cdot T_z \right) - m_s \cdot h \cdot I_z \cdot F_y \right]$$

Roll Angle, ϕ :

$$\dot{\phi} = p$$

wherein

$K_{vy} = m \cdot I_x \cdot I_z - m \cdot I_{xz}{}^2 - m_s{}^2 \cdot h^2 \cdot I_z$

and

I_x = Roll Moment

I_z = Yaw Moment

I_{xz} = Multiplication of the Roll Moment and the Yaw Moment

m_s = Spring mass

h = Height between the road and the center of a vehicle

and

Slip Angles, α :

Slip Angle of a front left wheel, $\dot{\alpha}_{fl}$:

$$\dot{\alpha}_{fl} = \frac{V_x}{\sigma_y}\left(\alpha_{fl\_ss} - \alpha_{fl}\right)$$

Slip Angle of a front right wheel, $\dot{\alpha}_{fr}$:

$$\dot{\alpha}_{fr} = \frac{V_x}{\sigma_y}\left(\alpha_{fr\_ss} - \alpha_{fr}\right)$$

Slip Angle of a rear left wheel, $\dot{\alpha}_{rl}$:

$$\dot{\alpha}_{rl} = \frac{V_x}{\sigma_y}\left(\alpha_{rl\_ss} - \alpha_{rl}\right)$$

Slip Angle of a rear right wheel, $\dot{\alpha}_{rr}$:

$$\dot{\alpha}_{rr} = \frac{V_x}{\sigma_y}\left(\alpha_{rr\_ss} - \alpha_{rr}\right)$$

Slip Ratio, s :

Slip Ratio of a front left wheel, $\dot{s}_{fl}$:

$$\dot{s}_{fl} = \frac{V_x}{\sigma_x}\left(s_{fl\_ss} - s_{fl}\right)$$

Slip Ratio of a front right wheel, $\dot{s}_{fr}$:

$$\dot{s}_{fr} = \frac{V_x}{\sigma_x}\left(s_{fr\_ss} - s_{fr}\right)$$

Slip Ratio of a rear left wheel, $\dot{s}_{rl}$:

$$\dot{s}_{rl} = \frac{V_x}{\sigma_x}\left(s_{rl\_ss} - s_{rl}\right)$$

Slip Ratio of a rear right wheel, $\dot{s}_{rr}$:

$$\dot{s}_{rr} = \frac{V_x}{\sigma_x}\left(s_{rr\_ss} - s_{rr}\right)$$

wherein

σ_x and σ_x are lateral and longitudinal relaxation length [m] .

4. (Original) The rollover control method as defined in claim 1, wherein said pre-rollover decision subroutine comprises the steps of:

determining whether a vehicle is turning based on said tire lateral force;

determining whether a vehicle is sharply turning after a first warning when the vehicle is determined to turn as mentioned in the above step; and

performing a control action in order to prevent the rollover after a second warning when the vehicle makes a sharp turn as mentioned in the above step.

5. (Original) The rollover control method as defined in claim 3, wherein the turning decision of a vehicle is made by a lifting phenomenon of the tire in which the first warning is given when one of the tires is decided to be lifted and the second warning is issued when two of the tires are judged to be lifted.

6. (Original) The rollover control method as defined in claim 3, wherein said control action to prevent the generation of the rollover comprises a toe-in control for the rear side tires, an engine output reducing control, and a vehicle speed reducing control.

7. (Original) The rollover control method as defined in claim 1, wherein said rollover decision subroutine comprises the steps of:

comparing said lateral velocity predicted and applied by the filter, with a reference value of the rollover decision; and

carrying out a control operation for passenger protection when the rollover is predicted in the above step.

8. (Original) The rollover control method as defined in claim 6, wherein the control operation for protecting the passengers comprises an airbag activation, a seatbelt pre-tensioner activation and a lateral side protection activation.

9. (Original) A rollover control system comprising:

a vehicle operation state detecting module for detecting a steering angle, a wheel Revolutions Per Minute (RPM), a yaw rate, a roll rate, a roll angle and a vehicle speed angle that vary in relation to changes in the running state of the vehicle;

a vehicle dynamics processing module for calculating a longitudinal velocity, a lateral velocity, a yaw rate, a roll rate, said roll angle, a slip angle and a slip ratio by a vehicle dynamical equation preset in a program after receiving said steering angle and said wheel RPM detected from said vehicle operation state detecting module;

a filter module for predicting a slip angle and a lateral velocity after a predetermined time by using the values calculated from said vehicle dynamics processing module and said yaw rate, said roll rate, said roll angle and said vehicle speed detected by said vehicle operation state detecting part;

a tire dynamics processing module for calculating a tire lateral force based on said slip angle value predicted at said applied filter module;

a pre-rollover decision module for deterring the rollover when its generation is predicted based on said lateral force produced from said tire dynamics processing module; and

a rollover decision module for performing a protective action for the passengers when the overturn is decided, based on said lateral velocity generated from said filter module after the rollover generation control action is performed by said pre-rollover decision module.